

**Surface Magnetometer Survey - Work Plan**  
**ARCS - Albion Sheridan Township Landfill Site**  
**Albion, Michigan**  
**04011.01**



## **INTRODUCTION**

A shallow electromagnetic (EM) survey was run over the main landfill site and adjacent property to the west. A Geonics EM-31 conductivity meter was used to simultaneously measure terrain conductivity (quadrature phase instrument response) to a maximum depth of about 18 feet and the in-phase instrument response (primarily an indicator of metal). These data were collected continuously along east-west traverse lines spaced 50 feet apart. Figure 1 shows the EM-31 traverse line locations.

The quadrature and in-phase data were gridded and contoured (Figures 2 and 3, respectively). Several anomalies to the north and south that are attributable to surface debris are indicated. The distribution of the bulk of anomalies in both data sets indicates that, with the exception of those areas not surveyed, the landfill boundaries can be delineated. The quadrature and in-phase data recorded along each EM31 profile line were also plotted. The landfill boundaries as indicated along individual traverse lines are plotted on Figure 1.

It should be noted that a number of anomalies observed along the eastern site boundary may be related to extensive surface debris observed between lines 5800N and 6150N and east of station 4800E.

## **OBJECTIVE AND SCOPE**

A surface magnetometer survey will be conducted over selected areas within the landfilled portion of the site, as identified based on EM-31 data, to determine the potential presence or absence of buried steel drums or other ferrous metal containers.

EM-31 data have been reviewed for data indicative of buried metallic objects or debris. Based on the review, four survey areas have been selected for further study using a magnetometer. These areas are labeled A, B, C and D on Figures 2 and 3. These areas will be surveyed in order from A to D, using a 10-foot by 12.5-foot grid. These dimensions have been selected to provide the densest practical coverage while taking advantage of the existing site grid that is expected to be at least partially in place.

The combined survey area measures approximately 157,500 square feet. The survey will require the refinement of the existing site grid and the occupation of approximately 1,400 stations for data collection. Two full field days have been allotted for this survey. If field conditions are favorable and the scope of work is completed in less than two days, additional EM anomalies may be surveyed with the magnetometer. However, due to budgetary constraints, the field effort will be terminated at the end of two days regardless of whether or not the original scope of work has been completed.

## **METHODS**

### **Site Gridding**

A 10-foot by 12.5-foot survey grid will be established in each of the four survey areas to allow proper referencing of the data to actual site locations. The grid in each area will be based on the 50-foot by 25-foot site grid established as part of the previous site geophysical survey. The grid coordinate system is illustrated in Figure 1.

### **Magnetometer Survey**

An EDA proton precision total field magnetometer/gradiometer will be used in accordance with the WWES SOP contained in the SAP entitled "Magnetometer Surveys" to survey the sites. At each grid station, both the total magnetic field strength and the vertical magnetic gradient will be measured and recorded digitally. The instrument sensor will be positioned at a height of 5.9 feet above the ground. The presence of any obvious surface metal objects or debris will be noted to facilitate data interpretation.

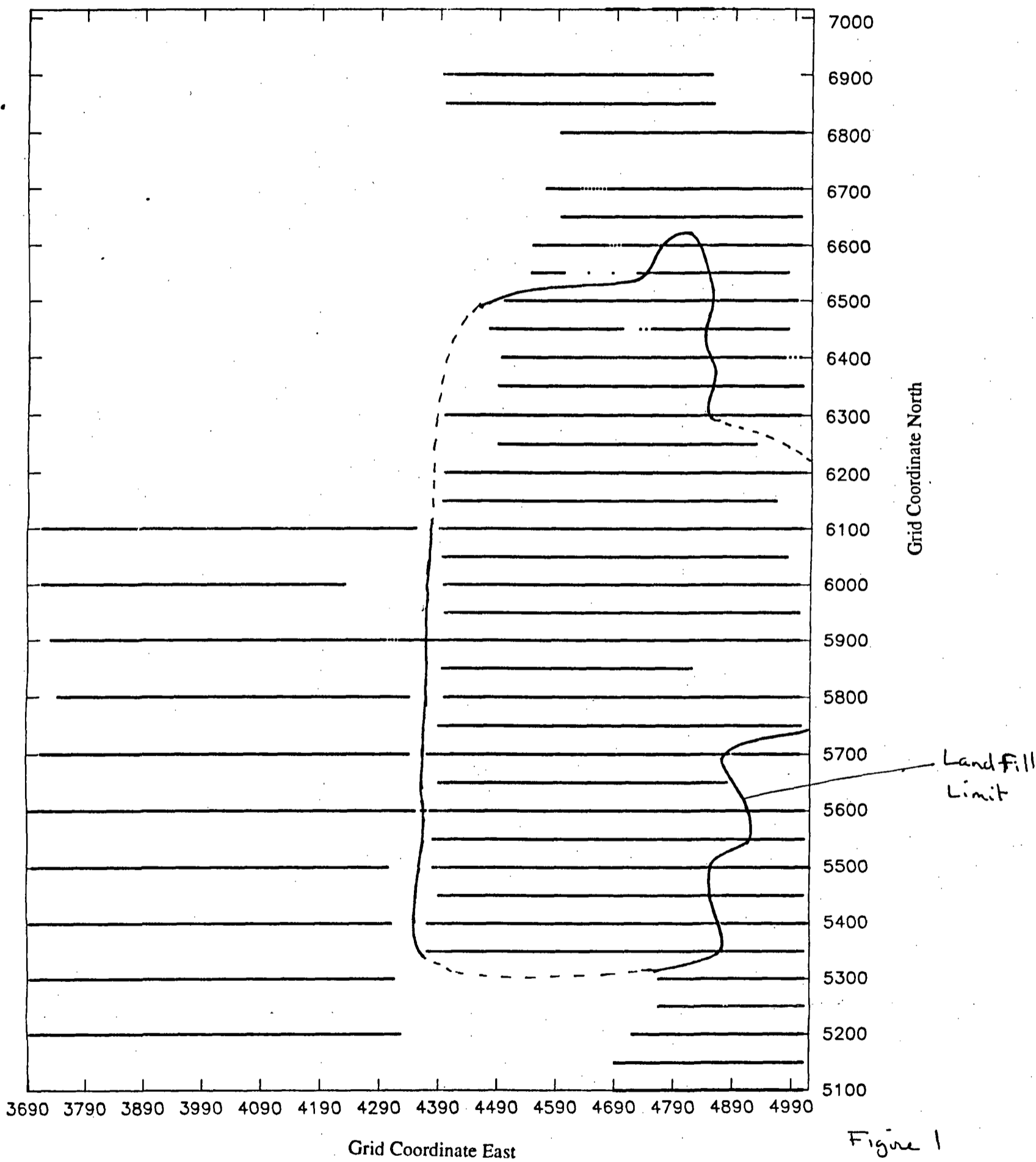
Following completion of the survey in each area, the digital data will be transferred to a field computer for processing and interpretation. The data will be gridded and contoured to produce total field strength and vertical gradient contour maps for each survey area.

## **DATA EVALUATION AND REPORT**

The contoured magnetic data will be evaluated for information on the location, depth and mass of ferrous metal objects or debris within each area to determine the potential for the presence of buried steel drums or other steel containers. These evaluations will be qualitative due to the fact that interpretation of magnetic anomalies associated with objects having significant permanent magnetism, as is the case with steel drums, requires simplifying assumptions that often do not adequately represent extremely complex conditions.

Preliminary results will be interpreted and sent to the MDNR and U.S. EPA for resolution of this issue. The formal survey results will be included, along with the results of the previous survey, in the RI report for the site.

EM31 TRAVERSE LINE LOCATIONS /LIMITS OF LANDFILL BASED ON EM31 DATA



EM31 QUADRATURE PHASE DATA  
CONTOUR INTERVAL = 10 mmhos/meter

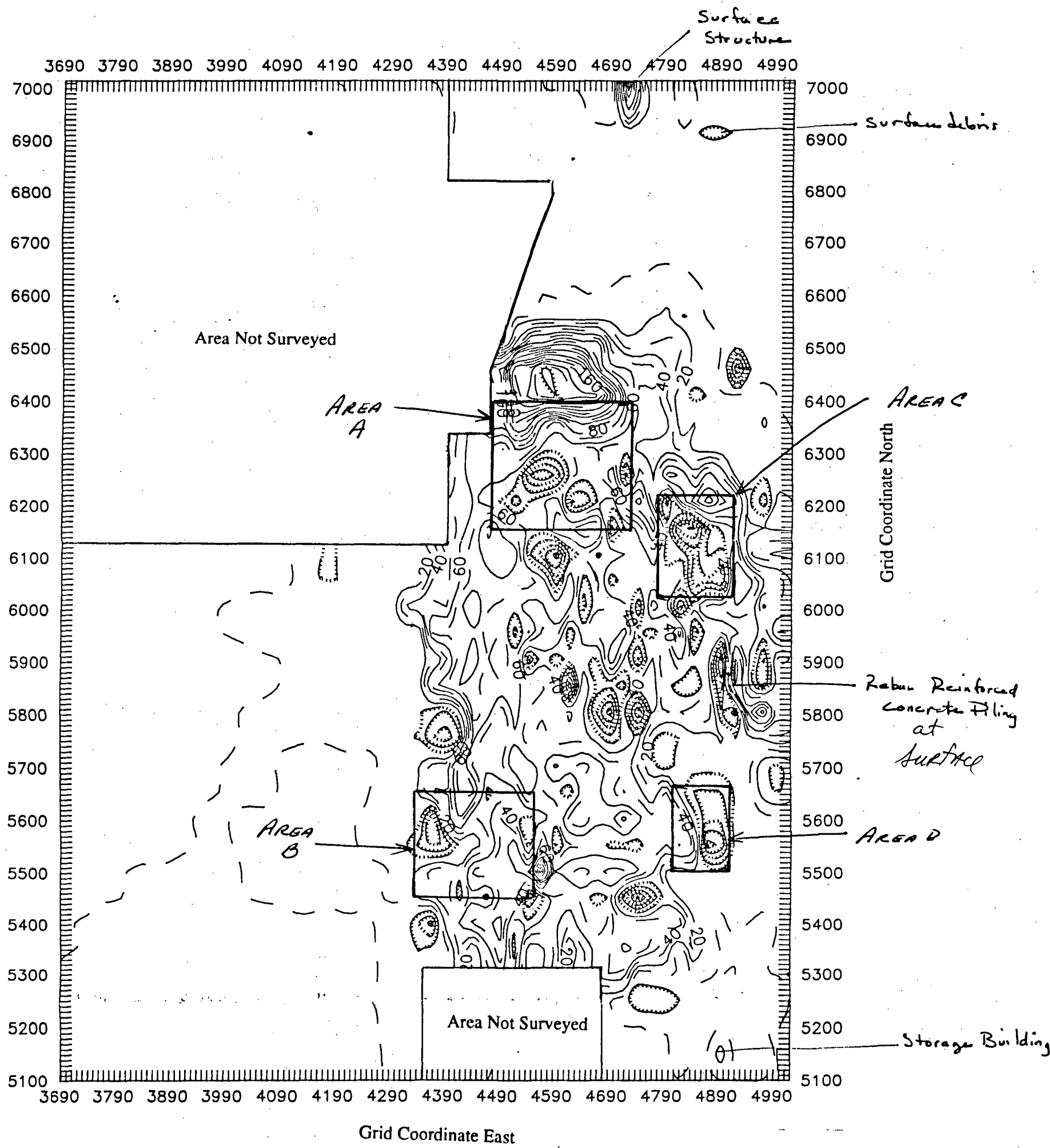


Figure 2.